

IRNSS - NAVIC

The Indian Space Research Organisation (ISRO) and its commercial wing ANTRIX developed the Indian Regional Navigation Satellite System or IRNSS with its operational name of NAVIC (Navigation with Indian Constellation). It is a Navigation Satellite System that will provide accurate real-time positioning and timing services over India and the region around the country.

The IRNSS - NAVIC topic can be related to multiple sections of the [UPSC Syllabus](#); Geography of *General Studies paper-1*, Science and Technology of *General Studies paper-3* and [Current Affairs](#).

What is NavIC?

- It is an Indian Regional Navigation Satellite System or IRNSS.
- It was developed in India by Indian Space Research Organisation ([ISRO](#)) and its commercial wing ANTRIX.
- It consists of 7 satellites at an altitude of approximately 36000 km above sea level.
 - 3 are in Geostationary Orbit
 - 4 are in Geosynchronous Orbit
- The objective of the NavIC is to provide navigation, timing and reliable positioning services in and around India.
- Working of the NavIC is very similar to the GPS (Global Positioning System) implemented by the United States.
- The NavIC is certified by 3GPP (3rd Generation Partnership Project) which is responsible for coordinating mobile telephony standards globally.

Indian Regional Navigation Satellite System (IRNSS)

- It is an independent regional navigational satellite system developed by India.
- Objective:
 - It is being designed to give precise position data service to users located in India and also to users in the area out-spreading up to 1500 km from India's boundary.
- The two kinds of services provided by IRNSS will be:
 - Standard Positioning Service (SPS) and
 - Restricted Service (RS).
- The system can offer a position accuracy of more than 20 m within India which is the primary area of service.

The IRNSS is being constructed by the Indian Space Research Organisation (ISRO) and is wholly under the Indian government's control. The need for such a system of navigation is that the availability of global satellite navigation systems like the GPS is not assured in hostile conditions.

Commercialization of NavIC

- Antrix, the commercial arm of ISRO has floated two separate tenders to identify industries that can develop dedicated NavIC-based hardware and systems.
- Suitable device manufacturers are being identified along with integrators of NavIC-based systems.
- NAVIC is being commercialized for the following reasons :
 - Navigation (Aerial, marines and terrestrial)
 - Maps (Charting, Plotting and Geodetic data capture)
 - Disaster Management

- Fleet Management and Vehicle Tracking (important during mining and transport operations)
- Mobile phone integration
- Precise timing (useful for power grids and ATMs)
- The Ministry of Road Transport and Highways has mandated that all national-permit vehicles must have such tracking devices. As a pilot, many fishing boats have been fitted with these devices that have a unique texting facility.
- The 3GPP certification will allow multiple possibilities of further commercialization of NavIC.

Click on the link to get the [List of Indian Satellites for UPSC](#).

NAVIC (Navigation with Indian Constellation) 2019

There are a few recent developments in the NAVIC (Navigation with Indian Constellation) according to ISRO:

- The leading semiconductor manufacturer *Qualcomm Technologies Inc.* developed and tested NavIC-friendly chipsets.
- This will help NAVIC support upcoming Automotive, Mobile and IoT applications and platforms.
- The collaboration will enable superior location-based services to India's industries and technology ecosystem.

NAVIC vs GPS

Parameter	NavIC	GPS
Accuracy	Up to 5 meters	Up to 20-30 meters
Frequency	S-band and L-Band	L- Band

The use of dual-frequency, both S and L Frequency Bands makes NavIC independent of using any delay-causing frequency models to detect frequency error.

UPSC Questions related to NavIC/IRNSS

Is NavIC better than GPS?

- NavIC provides higher accuracy when compared to the US-based GPS.
- NavIC is independent of using any delay-causing frequency models to detect frequency error due to its use of Dual-Band (S and L bands) frequencies.
- This makes it better than GPS but its area coverage is limited only to India and its neighbouring countries which is a limitation.

What is the Gagan Project?

- The Indian Space Research Organisation (ISRO) and the Airports Authority of India (AAI) in collaboration, developed an augmentation service for GPS over India, the Bay of Bengal, South-east Asia and the Middle East along with expansion up to Africa. This project is known as the **GPS Aided Geo Augmented Navigation (GAGAN) Project**.
- The GPS-aided GEO augmented navigation (GAGAN) is an implementation of a regional satellite-based augmentation system (SBAS) by the Indian government. It is a system to improve the accuracy of a GNSS receiver by providing reference signals.

Also, to read **Semi Cryogenic Technology for Gaganyaan**: RSTV - In-Depth, [CLICK HERE](#)

